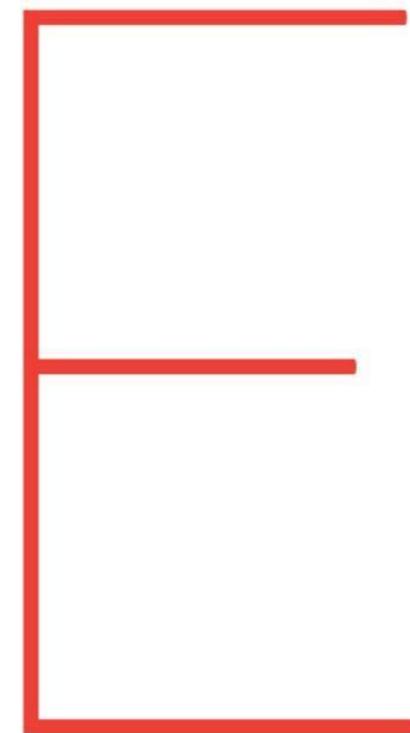
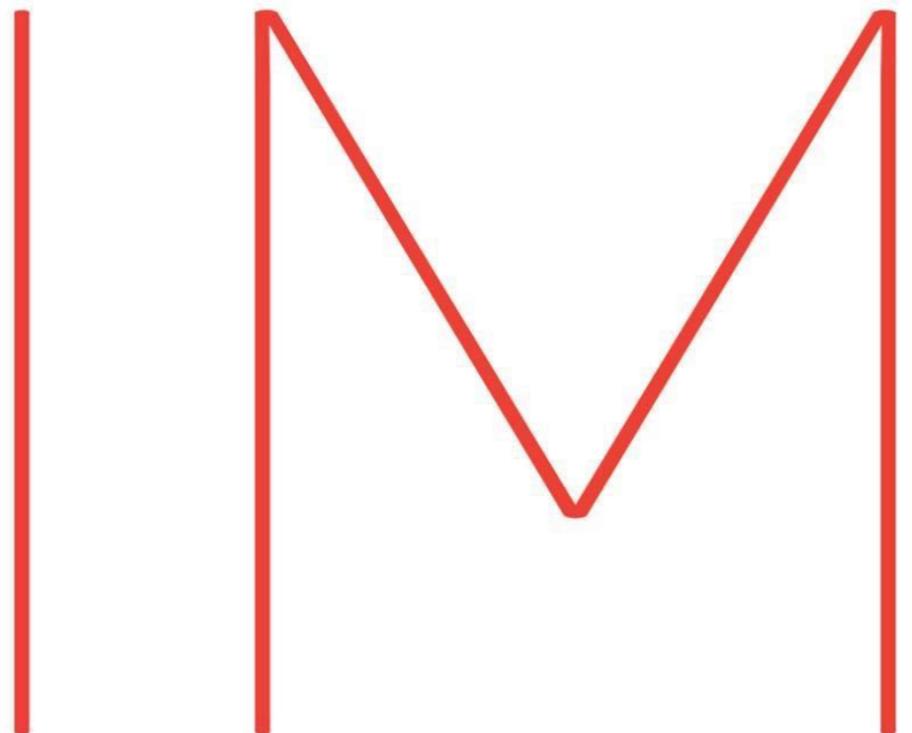


maraton



# Os palestrantes



# O que é a Maratona?

- Competição em grupo
- Criada em 1996
- Resolver problemas
- Trabalhar em equipe
- Código rápido e preciso



Maratona de  
Programação

# Como funciona?

- Diversos problemas
- Duração de 5 horas
- Times de 3 pessoas
- Apenas 1 computador
- Correção em tempo real
- Ganha quem resolve mais
- Desempate por tempo
- 1 Acerto = 1 Balão



# Etapas

- Seletiva Interna
  - 6 vagas:
    - Melhor time de bixes
    - 3 melhores total
    - 2 seletiva individual
- Sub-regional
- Brasileira
- Final Mundial (ACM-ICPC)



# ICPC



- ICPC existe desde os anos 70

Organizado pela ACM (Association for Computer Machinery)

# Exemplos de Problemas

# Busca em lista



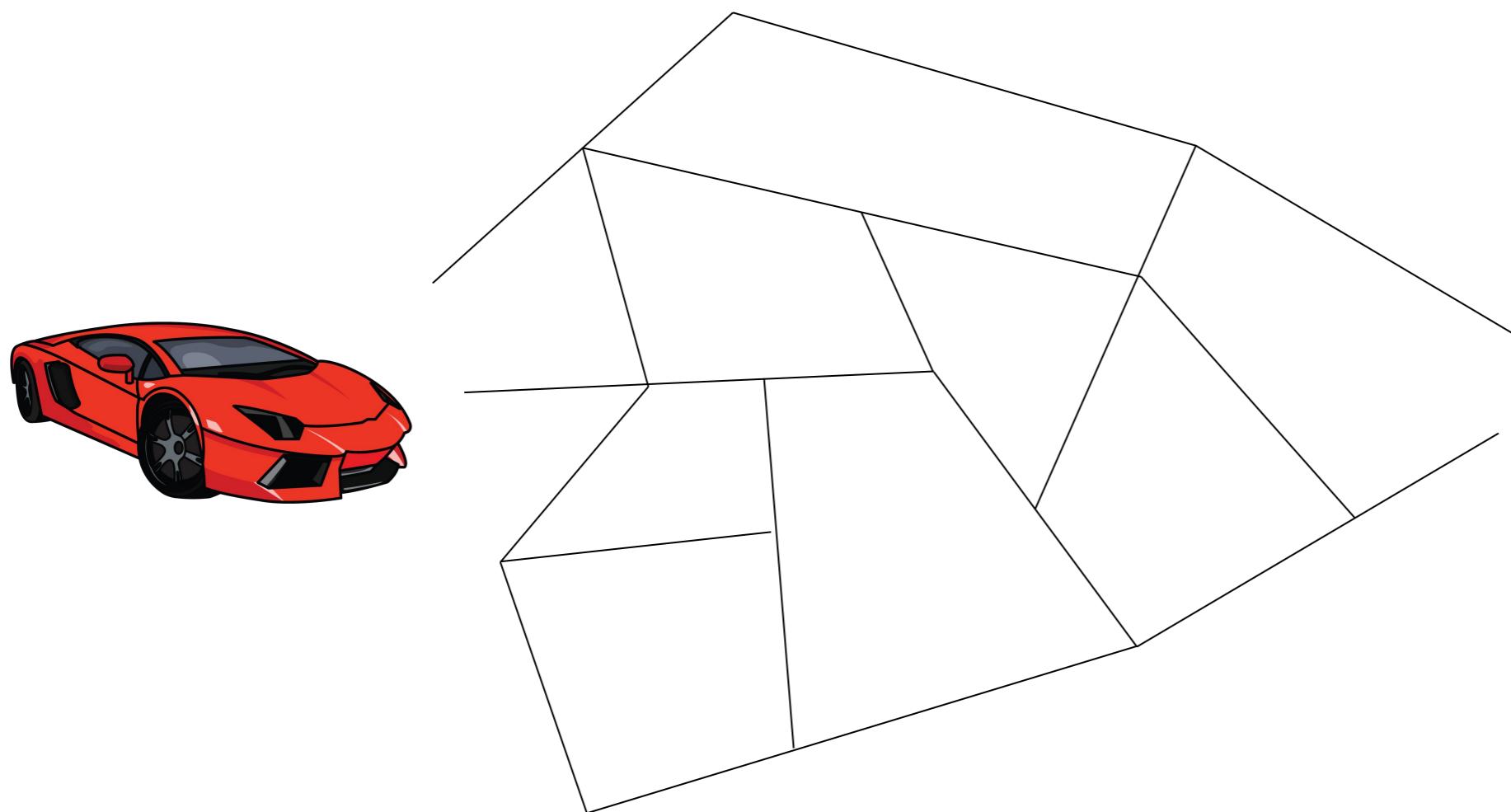
# Busca em lista

|           |         |    |  |         |    |                                     |
|-----------|---------|----|--|---------|----|-------------------------------------|
| <b>M.</b> | 390.075 | 19 | Mariana Marques de Holanda             | 465.434 | 15 | Maria                               |
|           | 396.806 | 20 | Manana Massimessi Fernandes            | 458.793 | 13 | Mylena Bretone Motta                |
|           | 485.025 | 15 | Mariana Monteiro de Carvalho e S Prado | 487.148 | 10 | Nadia Nunes de Camargo              |
|           | 414.666 | 22 | Mariana Pires Monteiro Lopez           | 370.710 | 17 | Natalia Arena Freire                |
|           | 084.217 | 20 | Mariana Ruggiero Ramalho               | 376.830 | 1  | Natalia Alvaras Lima                |
|           | 448.092 | 6  | Mariana Silva Lima                     | 397.229 | 12 | Natalia Camilo de Almeida           |
|           | 045.815 | 10 | Mariana Soares Costa                   | 488.412 | 11 | Natalia Garcez Rissardi             |
|           | 369.605 | 8  | Mariana Vasconcelos Brisighello        | 464.778 | 6  | Natalia Hatsumi Takahashi           |
|           | 353.505 | 4  | Marilia de Souza Mota                  | 413.066 | 18 | Natalia Martinez Meira              |
|           | 360.447 | 15 | Marina Araujo Nascimento Pereira       | 491.668 | 1  | Natalia Matsuda Cararetti           |
|           | 419.103 | 20 | Marina Botelho de Mesquita             | 237.166 | 4  | Natalia Mayumi Fujita               |
|           | 460.646 | 4  | Marina Cappa Santori                   | 444.561 | 20 | Natalia Mayumi Sato Calvano         |
|           | 373.264 | 15 | Marina Carmeiro Abbatepaulo            | 236.031 | 10 | Natalia Raposo Pinto do Amaral      |
|           | 361.197 | 15 | Marina da Silva Yanaguita              | 456.132 | 11 | Natalia Sant' Lopes Garcia          |
|           | 157.820 | 18 | Marina Giunab Dangelo                  | 434.384 | 6  | Natalia Silva Maia Melo             |
|           | 365.065 | 2  | Marina Goncalves Oliveira da           | 363.297 | 14 | Natalia Yukari Monkawa              |
|           | 079.916 | 15 | Marina Ribeiro dos Santos M            | 068.886 | 18 | Natalie Del Pilar Zavaleta Castillo |
|           | 372.074 | 15 | Marina Sentana Manoliola               | 447.331 | 19 | Natalie Shizue Nagata               |
|           | 233.067 | 1  | Marina Suzano Baptiste                 | 509.526 | 19 | Natan Bessa Bronzatto               |
|           | 430.341 | 20 | Mario Henrique Scapin                  | 228.418 | 2  | Natasha Pimentel Gottardi           |
|           | 443.206 | 10 | Mario Michel Futuvi                    | 426.649 | 18 | Nathalia da Silva Batista           |
|           | 129.029 | 1  | Martin Mantovani                       | 345.495 | 12 | Nathalia Galvao Rodrigues da Silva  |
|           | 461.279 | 19 | Maryana Ferreira                       | 339.617 | 6  | Nathalia Leme Romanholi de Oliveira |
|           | 026.356 | 16 | Mateus Machado                         | 366.006 | 10 | Nathalia Ramos Lima                 |
|           | 475.546 | 3  | Mateus Marques                         | 1.617   | 1  | Nazare Pereira Brito                |
|           | 475.313 | 19 | Matheus Alves                          | 1.188   | 6  | Nicolas Moreira de Carvalho Hagel   |
|           | 511.394 | 2  | Matheus Alves                          | 1.188   | 11 | Nicolas de Souza                    |
|           | 953.082 | 19 | Matheus Alves                          | 1.188   | 16 | Nicolas Farias Moretti              |
|           | 429.320 | 10 | Matheus Alves                          | 1.188   | 7  | Nicolas Ivanovic                    |
|           | 483.119 | 11 | Matheus Alves                          | 1.188   | 21 | Nicole Evelyn Santos Bonfim Bascope |
|           | 480.952 | 3  | Matheus Alves                          | 1.188   | 20 | Nino Consolini Cirenza              |
|           | 279.748 | 9  | Matheus Alves                          | 1.188   | 13 | Nuria Nogueira                      |
|           | 367.754 | 12 | Matheus Alves                          | 1.188   | 12 | Osmil Marques de Souza Filho        |
|           | 498.834 | 13 | Matheus Alves                          | 1.188   | 9  | Osvaldo Moura de Oliveira           |
|           | 475.930 | 11 | Matheus Alves                          | 1.188   | 10 | Otavio Augusto Santo                |
|           | 475.895 | 22 | Matheus Alves                          | 1.188   | 2  | Otavio dos Santos                   |
|           | 468.001 | 12 | Matheus Alves                          | 1.188   |    |                                     |
|           | 470.509 | 4  | Matheus Alves                          | 1.188   |    |                                     |
|           | 413.610 | 6  | Matheus Silveira                       | 1.188   |    |                                     |
|           | 476.857 | 1  | Matheus Valentim de Souza              | 1.188   |    |                                     |
|           | 419.594 | 6  | Mathias Debab Venosa                   | 1.188   |    |                                     |
|           | 440.423 | 2  | Matias Albuquerque Burman              | 1.188   |    |                                     |
|           | 475.896 | 20 | Mauricio Passos Vital                  | 1.188   |    |                                     |
|           | 324.944 | 4  | Mayara Brandao Salguero                | 1.188   |    |                                     |
|           | 433.646 | 9  | Milena Sayuri Kamiraga Oshikata        | 1.188   |    |                                     |
|           | 438.862 | 2  | Milena Silva Micali                    | 1.188   |    |                                     |
|           | 445.292 | 17 | Milena Yuki Watanabe                   | 1.188   |    |                                     |
|           | 513.076 | 14 | Milton Jose Bonciotto                  | 1.188   |    |                                     |
|           | 400.073 | 18 | Mirelle Ramos da Silva                 | 1.188   |    |                                     |
|           |         |    |  | 1058942 | 21 | Pablo Almeida Garcia                |
|           |         |    |  | 1057299 | 3  | Pablo de Jesus Montes Stracieri     |
|           |         |    |  | 1080304 | 22 | Paloma de Carvalho Siqueira         |
|           |         |    |  | 1056138 | 7  | Paola Pardini Gaeta                 |
|           |         |    |  | 1057505 | 13 | Patricia Nakabara                   |
|           |         |    |  | 1056138 | 2  | Patrick de Almeida Couto            |
|           |         |    |  | 1056138 | 18 | Patrick de Oliveira Viana           |
|           |         |    |  |         |    | 341.51                              |
|           |         |    |  |         |    | 486.194                             |
|           |         |    |  |         |    | 444.217                             |
|           |         |    |  |         |    | 466.237                             |
|           |         |    |  |         |    | 453.281                             |
|           |         |    |  |         |    | 509.604                             |
|           |         |    |  |         |    | 337.81                              |
|           |         |    |  |         |    | 477.01                              |
|           |         |    |  |         |    | 431.91                              |
|           |         |    |  |         |    | 376.61                              |
|           |         |    |  |         |    | 382.41                              |
|           |         |    |  |         |    | 444.95                              |
|           |         |    |  |         |    | 446.34                              |
|           |         |    |  |         |    | 236.89                              |
|           |         |    |  |         |    | 452.45                              |
|           |         |    |  |         |    | 403.45                              |
|           |         |    |  |         |    | 420.31                              |
|           |         |    |  |         |    | 493.97                              |
|           |         |    |  |         |    | 477.43                              |
|           |         |    |  |         |    | 423.65                              |
|           |         |    |  |         |    | 367.73                              |
|           |         |    |  |         |    | 104.01                              |
|           |         |    |  |         |    | 072.71                              |
|           |         |    |  |         |    | 365.63                              |
|           |         |    |  |         |    | 237.65                              |
|           |         |    |  |         |    | 469.01                              |
|           |         |    |  |         |    | 496.80                              |
|           |         |    |  |         |    | 427.43                              |
|           |         |    |  |         |    | 396.81                              |
|           |         |    |  |         |    | 534.59                              |
|           |         |    |  |         |    | 378.16                              |
|           |         |    |  |         |    | 460.41                              |
|           |         |    |  |         |    | 021.83                              |
|           |         |    |  |         |    | 437.34                              |
|           |         |    |  |         |    | 324.19                              |
|           |         |    |  |         |    | 337.08                              |
|           |         |    |  |         |    | 431.92                              |
|           |         |    |  |         |    | 484.89                              |
|           |         |    |  |         |    | 475.45                              |

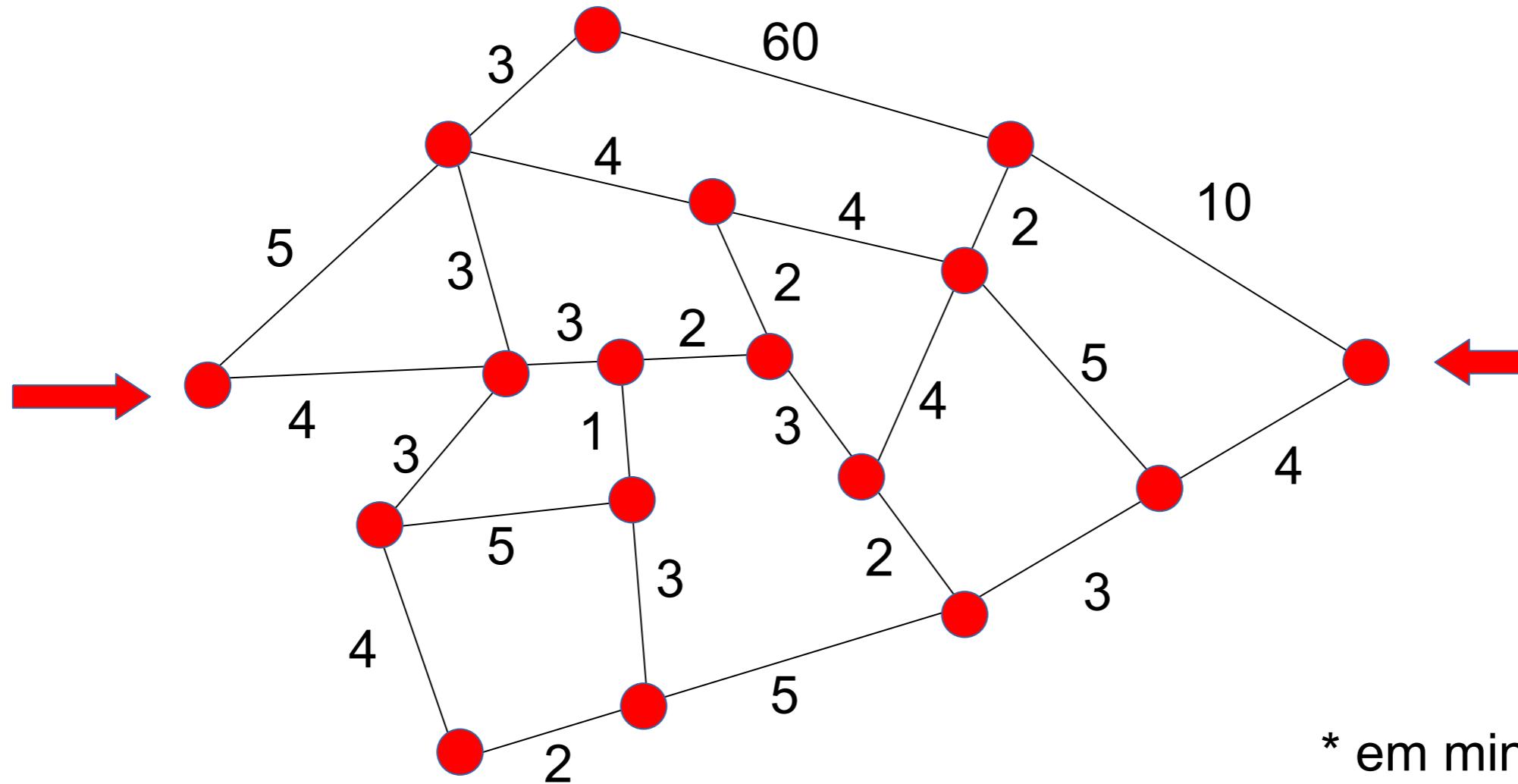
# Busca em lista

- Milhões de nomes? Bilhões?
- Ordenados?
- Nomes? Dicionário?
- Alfabeto?

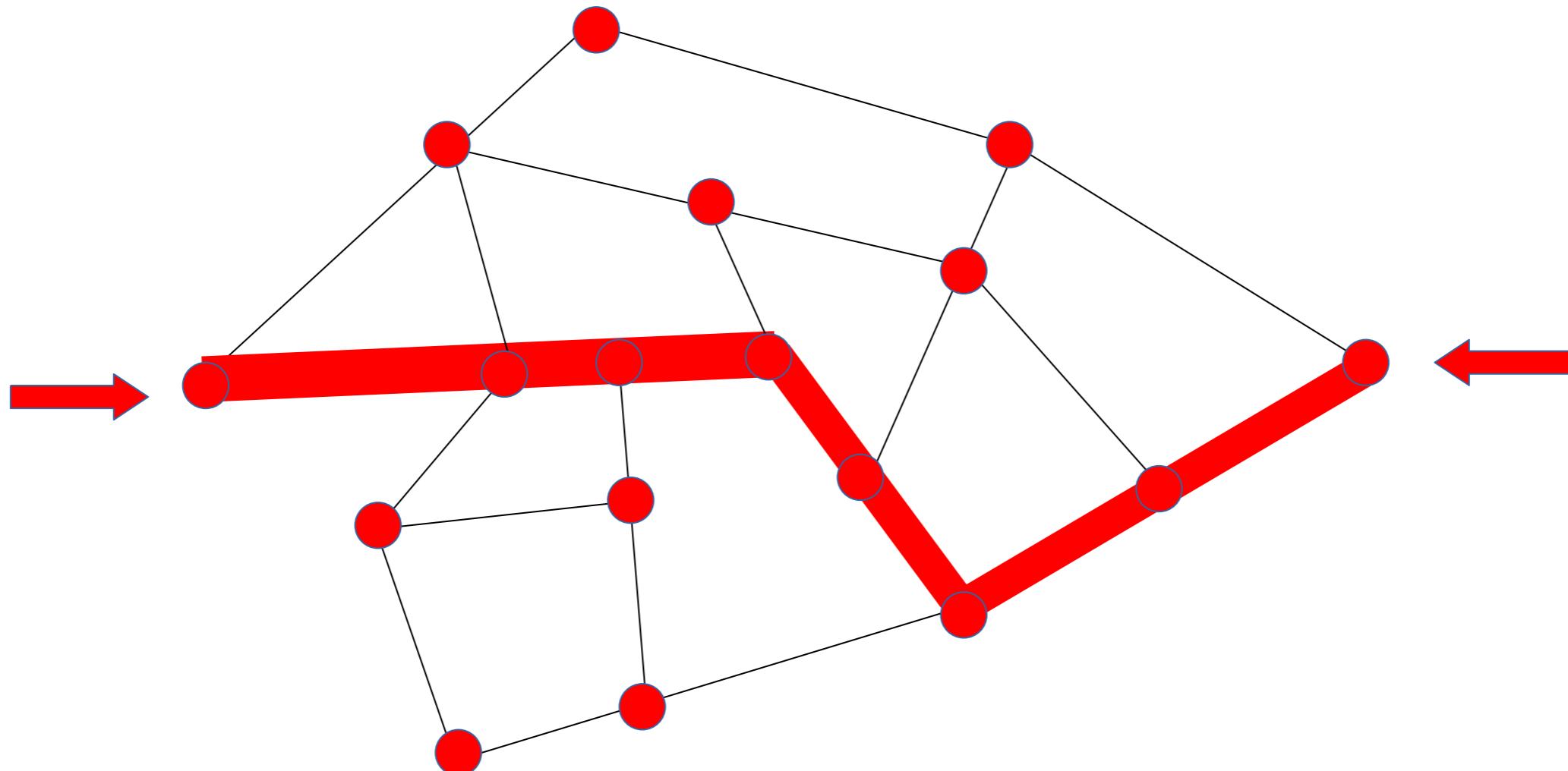
# Caminho mínimo



# Caminho mínimo



# Dijkstra!



Bae: Come over

Dijkstra: But there are so many routes to take and  
I don't know which one's the fastest

Bae: My parents aren't home

Dijkstra:

## Dijkstra's algorithm

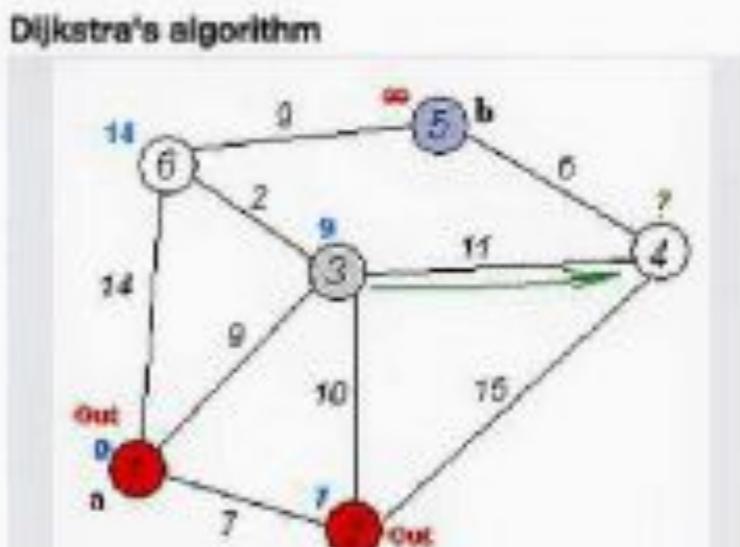


Graph search algorithm

Not to be confused with Dykstra's projection algorithm.

Dijkstra's algorithm is an algorithm for finding the shortest paths between nodes in a graph, which may represent, for example, road networks. It was conceived by computer scientist Edsger W. Dijkstra in 1956 and published three years later.<sup>[1][2]</sup>

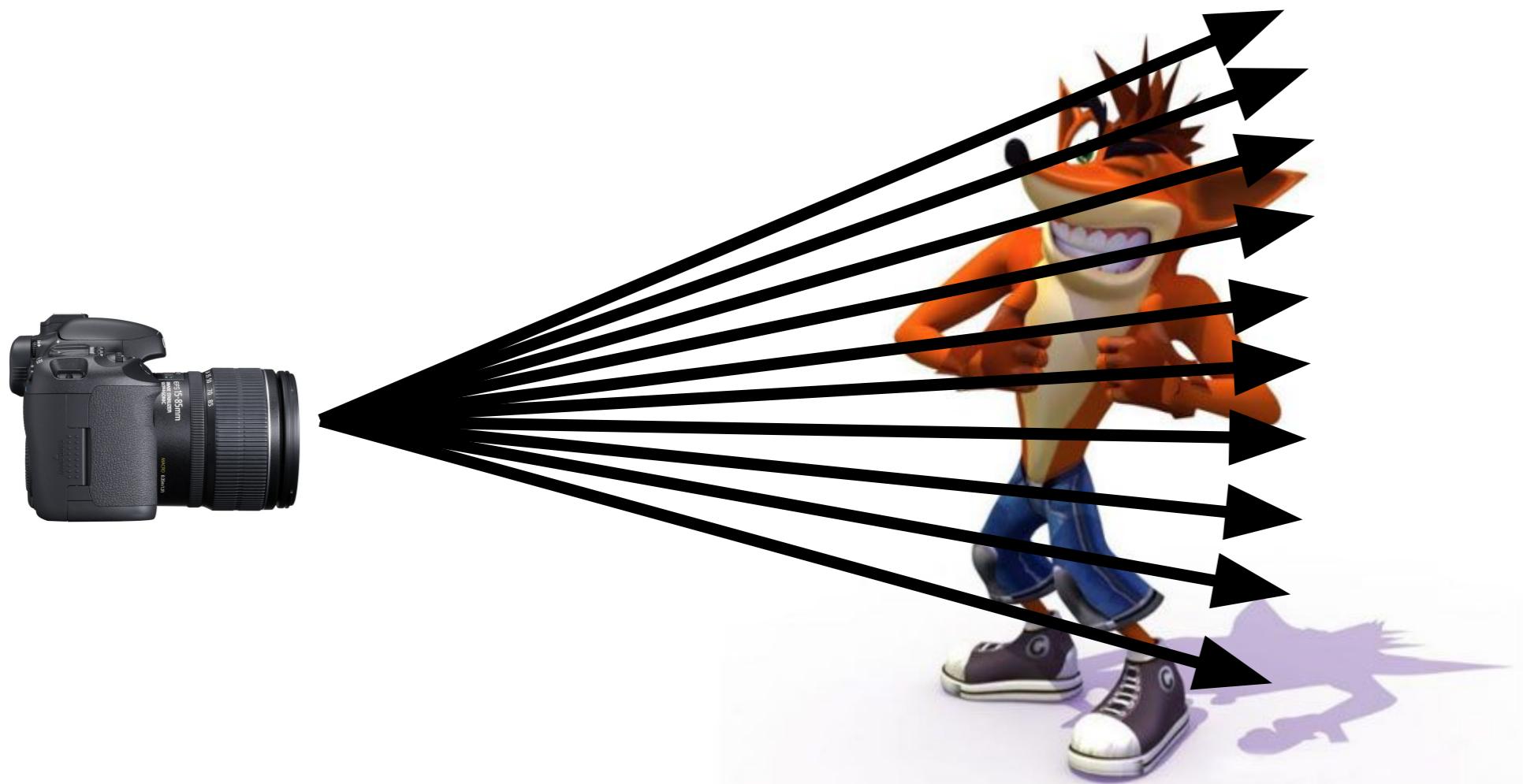
The algorithm exists in many variants; Dijkstra's original variant found the shortest path between two nodes,<sup>[2]</sup> but a more common variant fixes a single node as the "source" node and finds shortest paths from the source to all other nodes in the graph, producing a shortest-path tree.



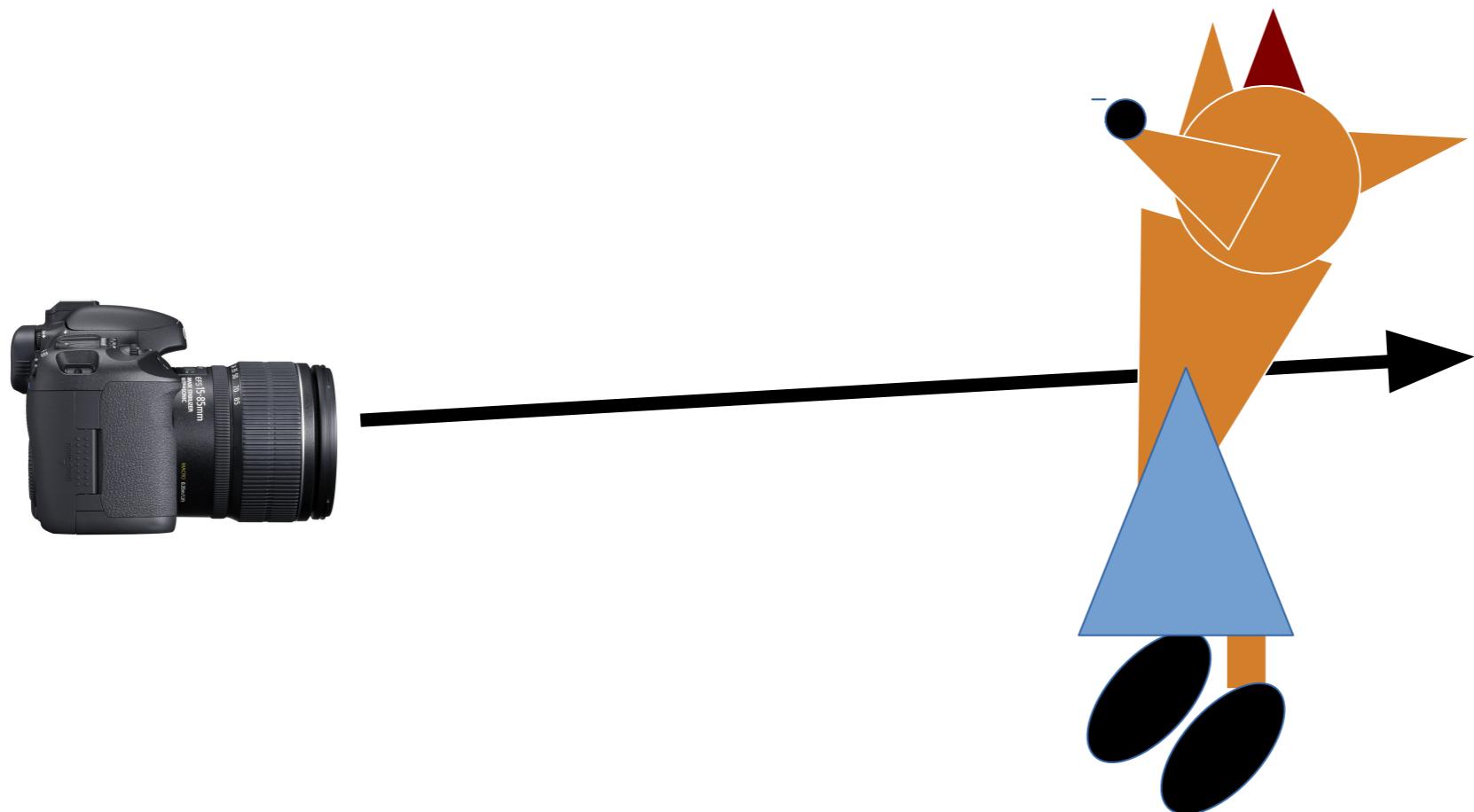
# Geometria



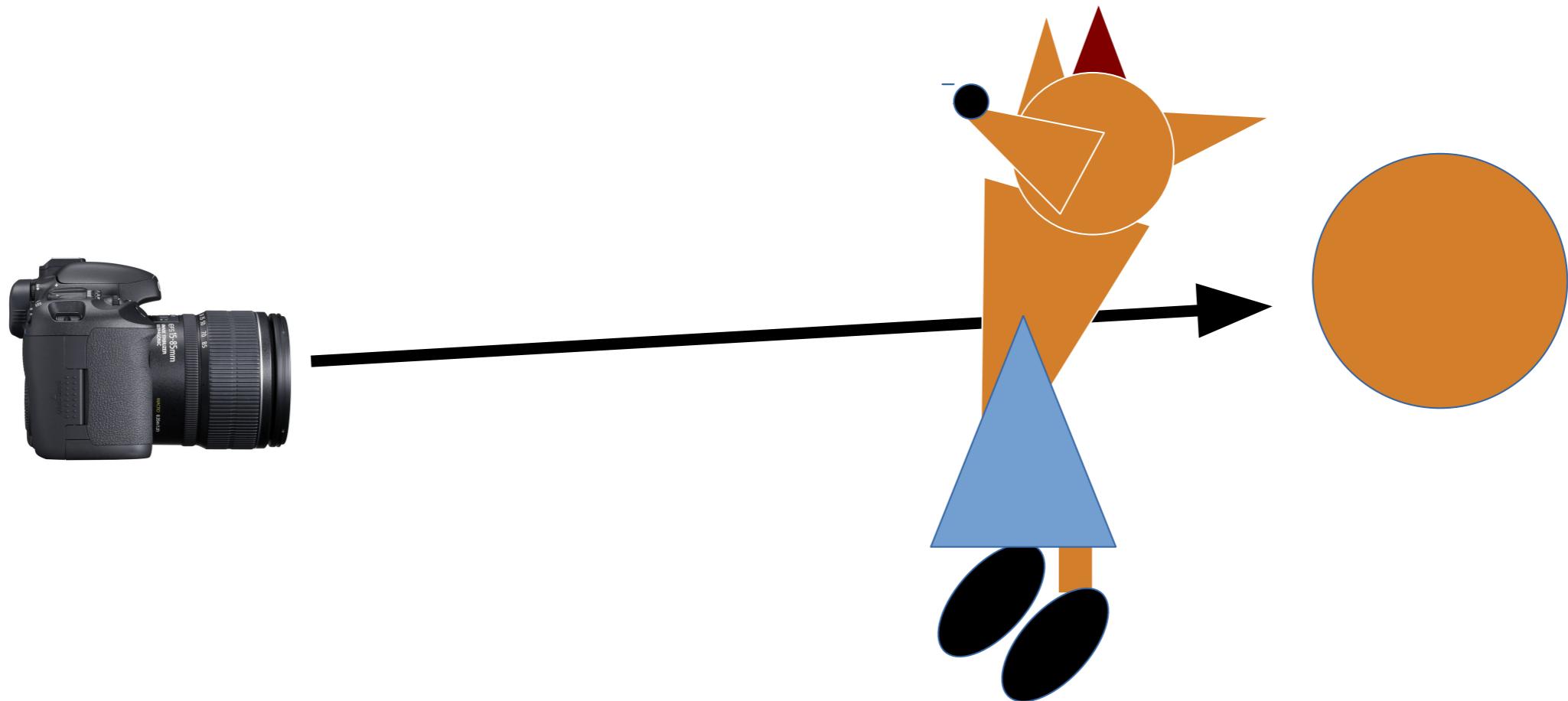
# Geometria



# Geometria



# Geometria



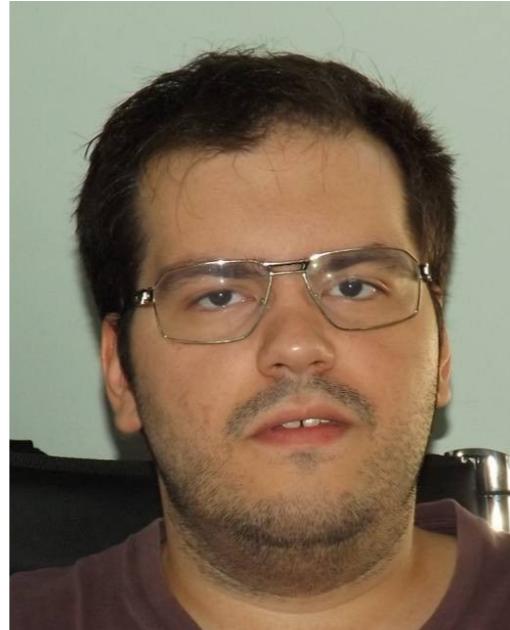
# Por que fazer parte?



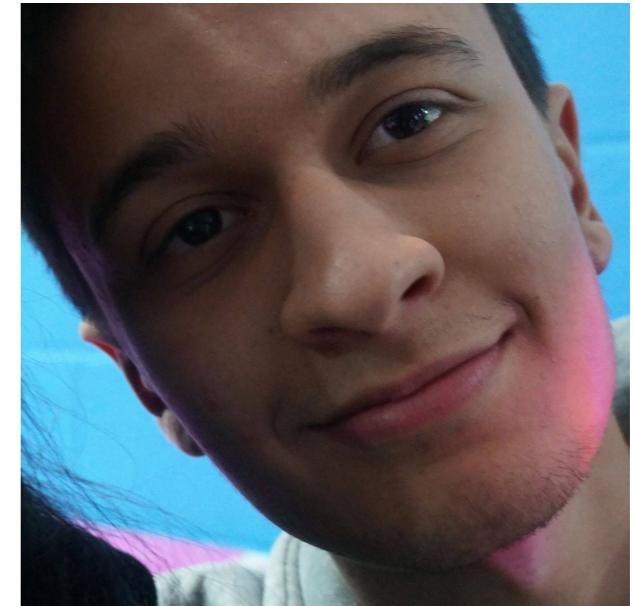
Google – Mountain View



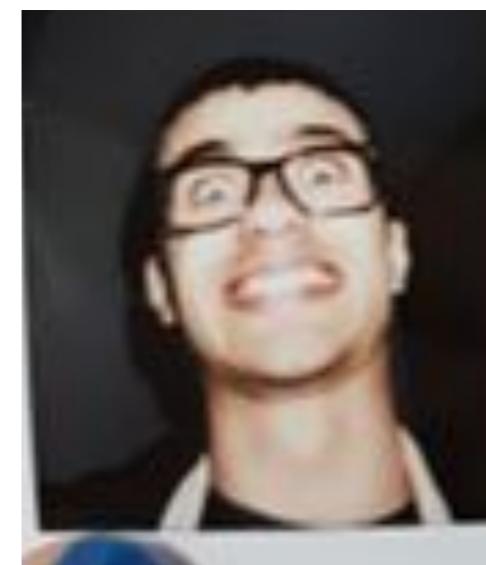
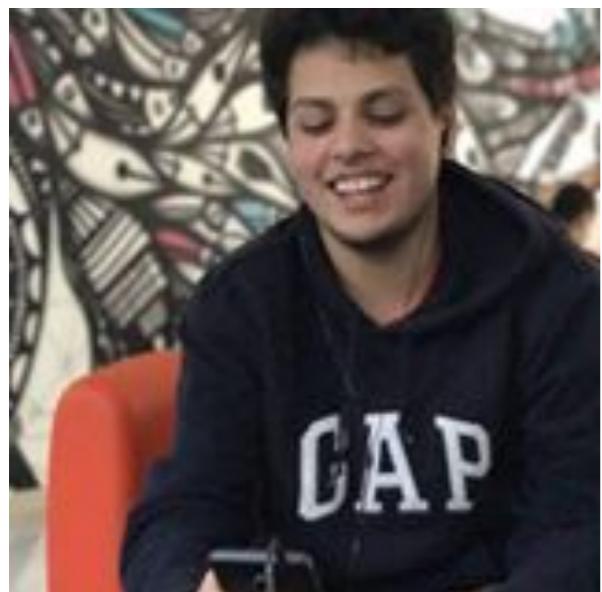
Facebook – São Paulo



Google – Belo Horizonte



Facebook – Londres



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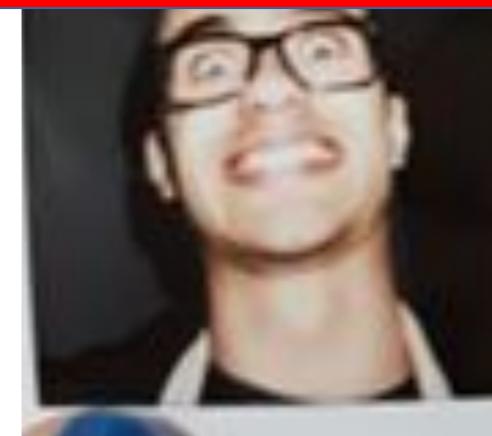
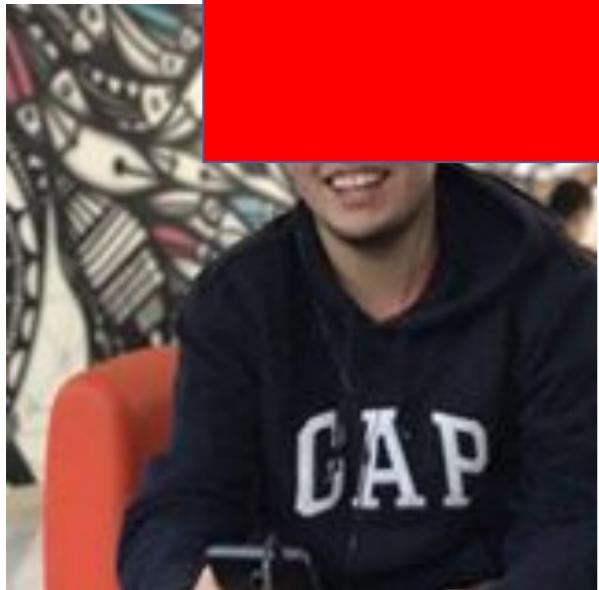
Google – Mountain View

Facebook – São Paulo

Google – Belo Horizonte



# SÓ ESSE SEMESTRE!



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|      | K | Solved | Time |
|------|---|--------|------|
| 2015 | 6 | 562    |      |
| 2015 | 6 | 573    |      |
| 2015 | 6 | 618    |      |
| 2015 | 6 | 674    |      |
| 2015 | 6 | 800    |      |
| 2015 | 6 | 804    |      |
| 2015 | 6 | 871    |      |
| 2015 | 5 | 403    |      |
| 2015 | 5 | 405    |      |
| 2015 | 5 | 523    |      |
| 2015 | 5 | 591    |      |
| 2015 | 5 | 602    |      |
| 2015 | 5 | 603    |      |
| 2015 | 5 | 630    |      |
| 2015 | 5 | 631    |      |
| 2015 | 5 | 673    |      |
| 2015 | 5 | 721    |      |
| 2015 | 5 | 811    |      |
| 2015 | 5 | 899    |      |
| 2015 | 4 | 351    |      |
| 2015 | 4 | 362    |      |

A person with short brown hair, wearing a green shirt, is focused on solving a Rubik's cube. They are positioned in front of a large screen that displays a scoreboard for a Rubik's cube competition. The scoreboard includes columns for Rank, Solved, Score, and various solved and unsolved states (A, B, C, D, E, F, G, H, I). The university logo of the host institution, Universidade de São Paulo - Instituto de Matemática e Estatística, is also visible on the screen. In the background, there are other people and a large wall mural featuring the Brazilian flag and the word 'Brasil'.

| Rank | Solved | Score |
|------|--------|-------|
| 37   | 4      | 675   |

Universidade de São Paulo - Instituto de Matemática e Estatística

A B C D E F G H I



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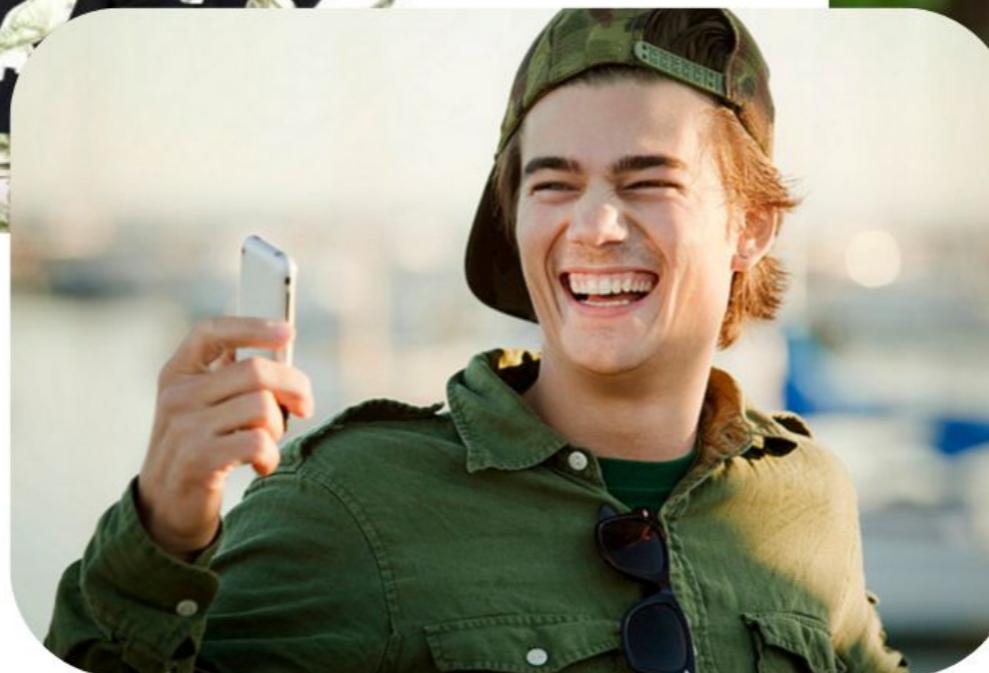


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IME

# Você SEM maratona



# Você COM maratona



# O que é o MaratonIME?

- Grupo de estudos para Maratona
- Organizamos:
  - Simulados
  - Listas
  - Aulas
  - Rolês
  - Rolês ~muito~ intensos

# A GENTE É LEGAL



# Gostei! E agora?

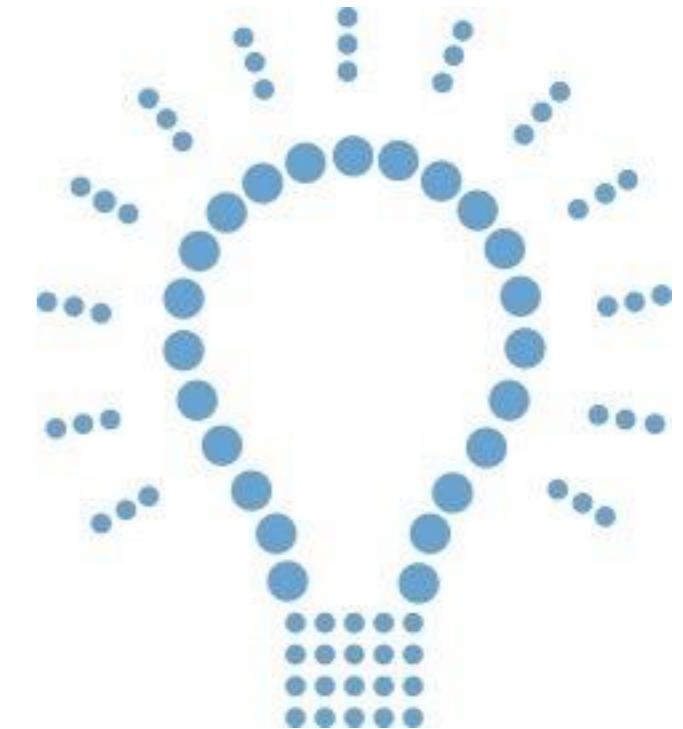
- Treinos presenciais semanais e bixeCamp
  - Quando? Sextas-feiras
  - Onde? No CEC
  - Que horas? Das 14h às 19h
- Revisão especial para vocês próxima aula!
- converse com a gente!

# Simulado para Bixes

- Dia 20 de abril
- Apenas programação básica!
- Bixe (inclui transferência) sem experiência
- Prêmios:
  - 0,5 ponto na média para equipe Campeã
  - Camisas do MaratonaIME :D
- Inscrições: [www.ime.usp.br/~maratona/simulado2018](http://www.ime.usp.br/~maratona/simulado2018)

# OBI Universitária

- Olimpíada Brasileira de Informática
- Apenas para 1º ano da graduação
- Individual
- Primeira Fase (Local): 17/05/2018
- Segunda Fase (Estadual): 22/06/2018
- Terceira Fase (Nacional): 25/08/2018

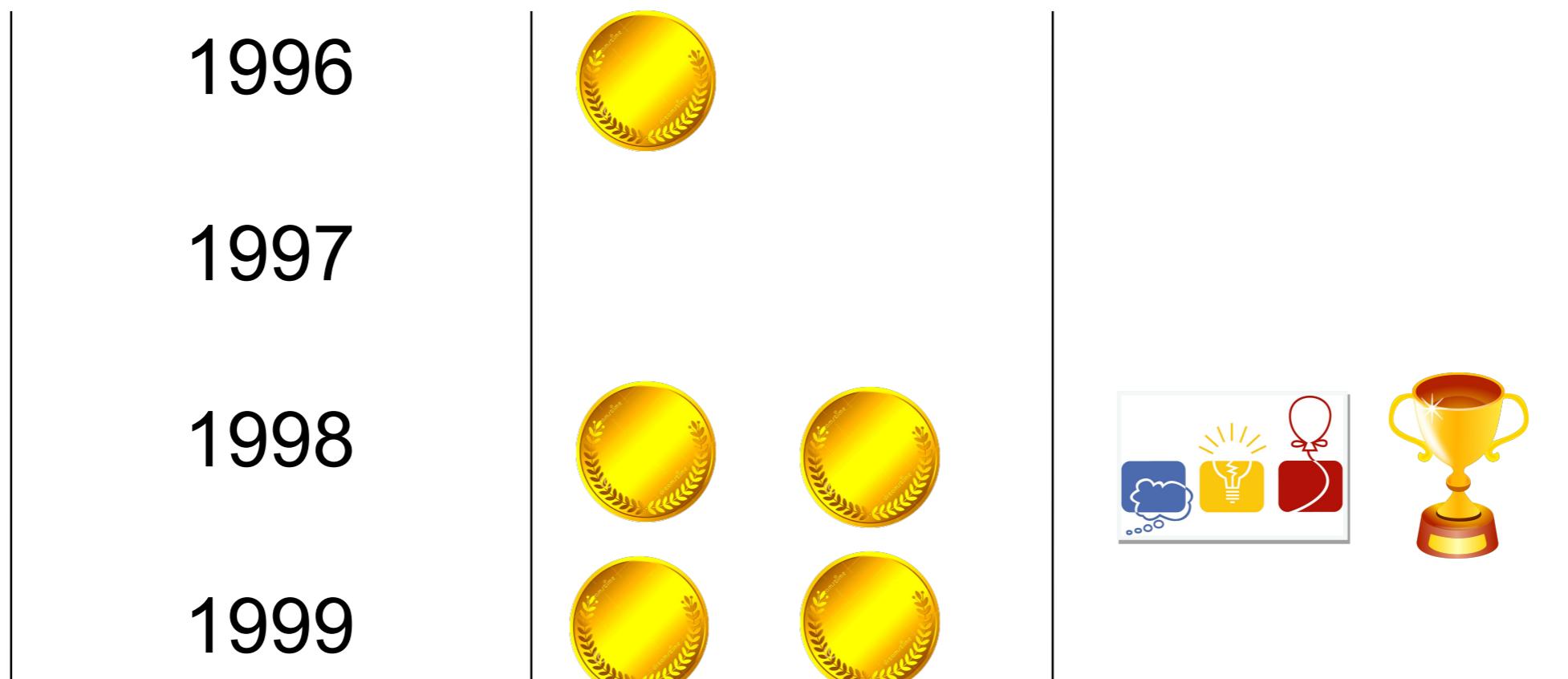


# Fale conosco

- Acesse: [www.ime.usp.br/~maratona](http://www.ime.usp.br/~maratona)
- Curta: [facebook.com/maratonime](https://facebook.com/maratonime)
- Converse pelo Telegram: [telegram.me/maratonime2018](https://telegram.me/maratonime2018)
- Até agora, perguntas?

Quase lá...

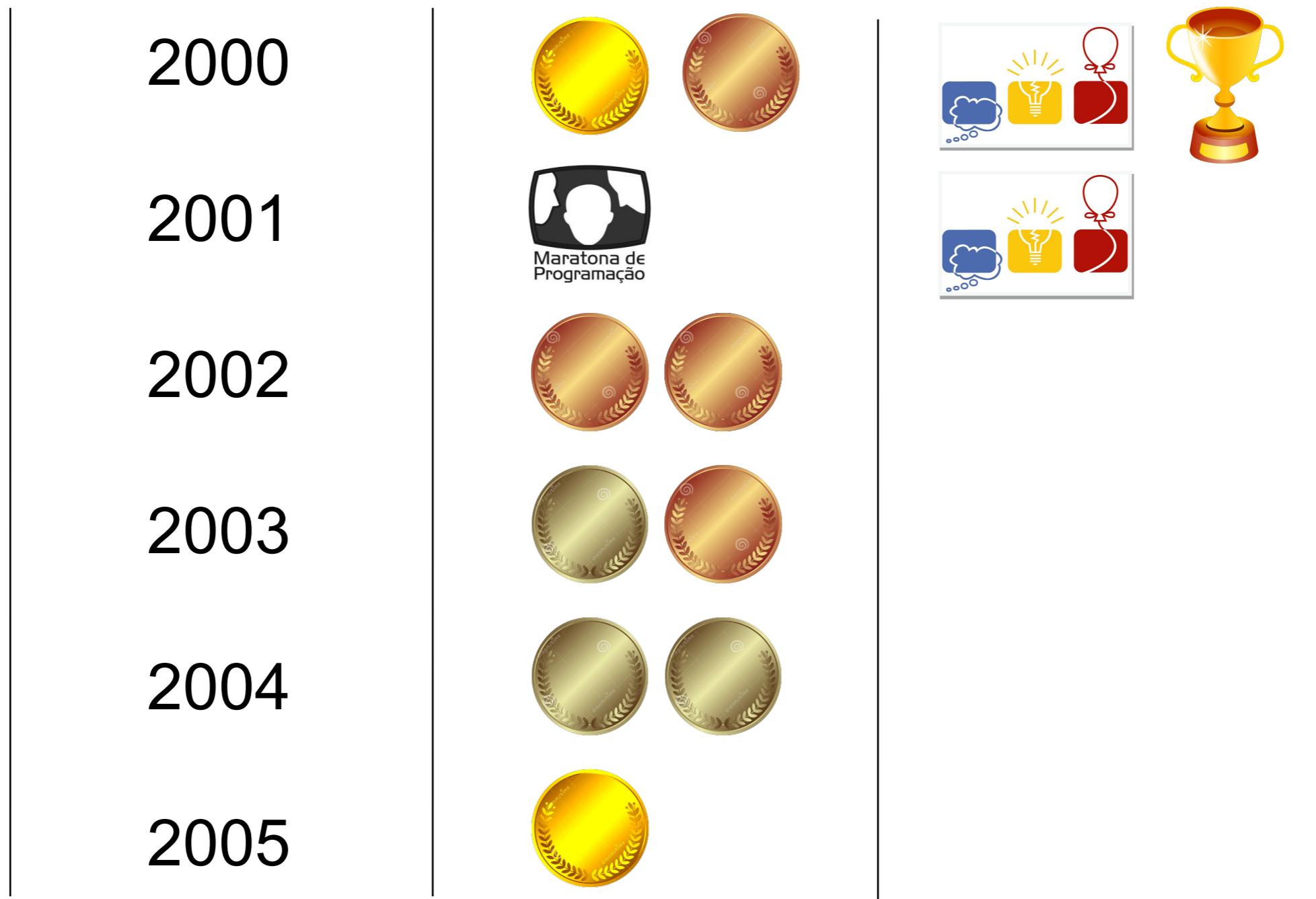
# IME na Maratona



# 1999, Eindhoven, Holanda



# IME na Maratona



# 2001, Vancouver, Canadá



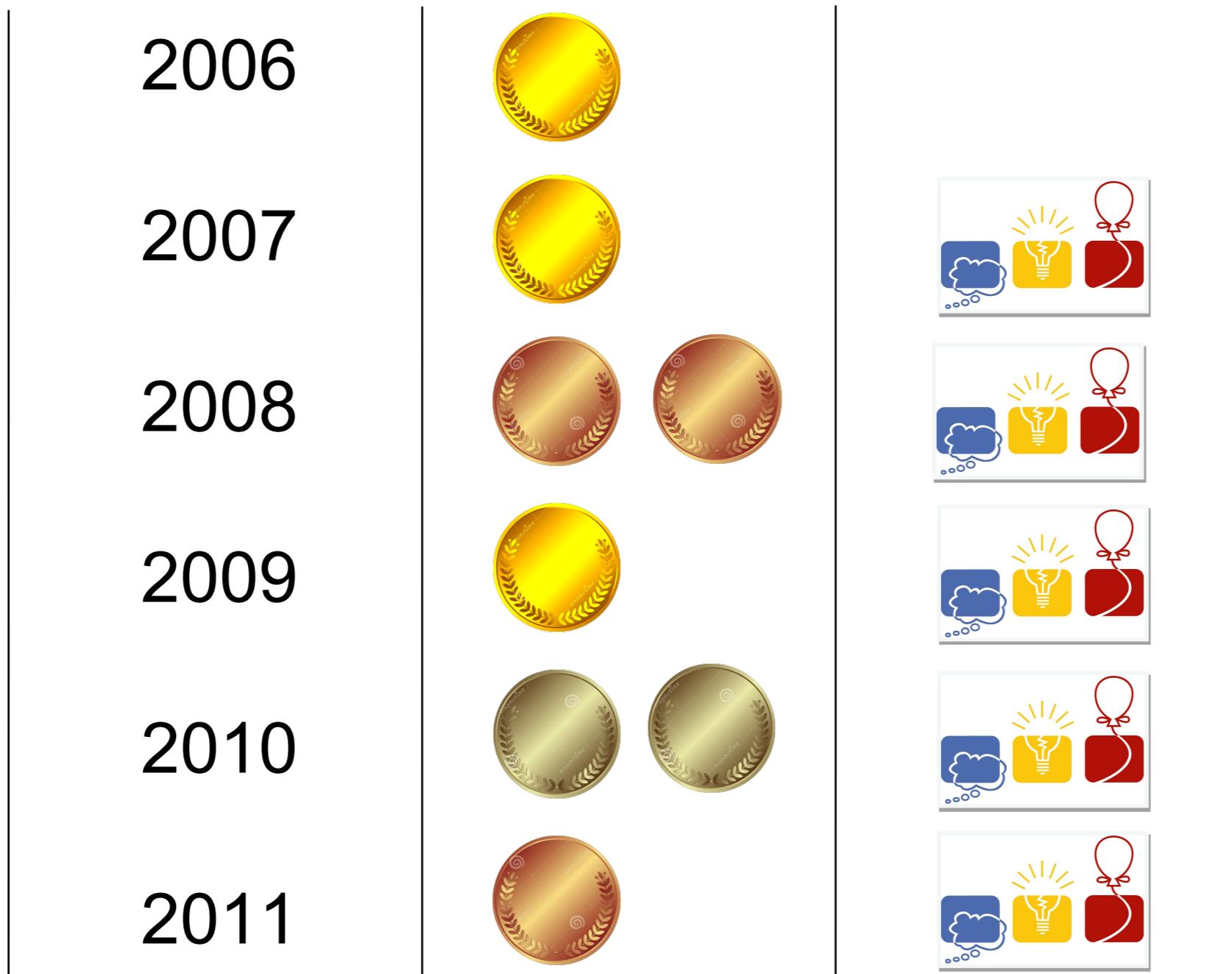
The Latin American Champions:  
Universidade de Sao Paulo



# 2002, Hawaii, Estados Unidos



# IME na Maratona



# 2007, Tóquio, Japão



# 2008, Banff, Canadá



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# 2010, Harbin, China



# 2011, Orlando, Estados Unidos



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# 2012, Varsóvia, Polônia



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IME

# IME na Maratona

|      |  |  |
|------|--|--|
| 2012 |  |  |
| 2013 |  |  |
| 2014 |  |  |
| 2015 |  |  |
| 2016 |  |  |
| 2017 |  |  |

# 2014, Ecaterimburgo, Russia



# 2015, Marrakesh, Marrocos



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# 2016, Phuket, Tailândia



**Universidade de São Paulo**  
2016 ACM-ICPC World Finals

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**IME**

# 2018, Pequim, China



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IME